Evaluating Derivatives

At a point,

Finding the slope of the curve
Finding the slope of the tangent line
Finding the instantaneous rate of change

Find the slope of the tangent line to

$$y = e^{\cos x} \text{ at } x = \pi$$

Find the instantaneous rate of change of

$f(t) = e^{-t} t^2$ at $t = 2$

$$\frac{d}{d\square}(f(x))\Big|_{x=\square}$$

Write the equation of the tangent line and normal line to $y = 2x^2 - 3x$ at $x = 4$

Find the linear approximation of $y = 2x^2 - 3x$ at $x = 4$.

Use it to estimate f(4.1)

An orange farmer currently has 200 trees yeilding an average of 15 bushels of oranges per tree. She is expanding her farm at a rate of 15 trees per year, while improved husbandry is improving her average annual yield by 1.2 bushels per tree. What is the current (instantaneous) rate of increase of her total annual production of oranges?

pages 107 - 108

Numbers 17,18,31,32

pages 124 - 126

Numbers 37-42,47,51,52

Instantaneous Velocity

The instantaneous velocity is the derivative of the position function s = f(t) with respect to time. At time t, the velocity is

$$v(t) = \frac{ds}{dt}$$

a.) Find the rate of change of the area A of a circle with respect to its radius r.

$A = \pi r^2$

$A' = 2\pi r$

b.) Evaulate the rate of change of A at r = 5 and at r = 10. $A' = 10\pi$ @ $r=5$

$A' = 20\pi$ @ $r=10$

c.) If r is measured in inches and A is measured in square inches, what units would be appropriate for dA/dr?